NOTES.

The centenary of the Paris Conservatoire des Arts et Métiers was celebrated on Friday last. The Priory of Saint-Martin-des-Champs, where the collections of the Conservatoire are installed, contains fourteen thousand exhibits. Seventeen professors hold evening classes in the building, and there are eight laboratories, one of photography and photometry being a recent addition. The Academy of Sciences has on several occasions presented objects of scientific interest to the museum of the Conservatoire, among them being its collection of machines, physical apparatus, and part of the contents of Lavoisier's laboratory.

The programme of the fourth International Congress of Zoology, to be held at Cambridge in August, has been issued. The meeting will open on Monday, August 22, with a reception at the Guildhall by the Mayor of Cambridge. On the following day, the formal opening of the Congress and election of officers will take place in the morning, and the Sections will meet in the afternoon. The Sections will be: (*a*) General Zoology; (*b*) Vertebrata; (*c*) Invertebrata (except the Arthropoda); (*d*) Arthropoda. On Wednesday, August 24, there will be a general meeting of the Congress to discuss the position of sponges in the animal kingdom. The discussion will be opened by Prof. Yves Delage, of Paris, and Mr. Minchin, of Oxford. On Thursday a general meeting will be held to discuss the origin of Mammals. The discussion will be opened by Prof. H. F. Osborn, of New York, and Prof. Seeley, of London. The Sections will meet on Friday, August 26, and on Saturday a general meeting will be held to settle the time and place of the fifth International Congress.

We notice with regret the announcements of the deaths of wo distinguished botanists: Prof. Anton Kerner, Ritter von Marilaun, professor of systematic botany in the University of Vienna, and Prof. Ferdinand Cohn, professor of botany in the University of Breslau.

The tenth Congress of Russian Naturalists and Physicians will be held at Kieff on August 21–30, under the presidency of Prof. J. Rachmaninow.

M. E. A. Martel, whose researches in underground caverns have often been referred to in these columns, has been created a Chevalier of the Legion of Honour.

At the annual general meeting of the Royal Statistical Society, held on Tuesday, it was announced that the subject of the essays for the Howard medal, which will be awarded in 1899, with 20*l.* as heretofore, is "The Sentences on, and Punishments of, Juvenile Offenders in the Chief European Countries and the United States." The essays should be sent in on or before June 30, 1899.

A destructive earthquake was experienced in some parts of Italy on Monday night. The shock was felt all along the Antrodoco valley, and several buildings were thrown down in the commune of Santa Rufina. The disturbance was felt at Rieti shortly after midnight.

Captain Sverdrup's polar expedition on board the *Fram* left Christiania on Friday morning.

A Reuter telegram from Tromsö reports that Mr. Walter Wellman, the American explorer, left on Monday on board his ice steamer *Frithyof* for the North Polar regions. Just before his departure from England Mr. Wellman gave to Reuter's representative an account of his expedition, in which he said that his aim was to reach the North Pole, and also to explore the still unknown northern parts of Franz Josef Land. The party consists of Prof. James H. Gore, Columbia University, a geodesist; Lieut. Evelyn B. Baldwin, who was on the Greenland ice cap with Lieut. Peary; Dr. Edward Hofma, naturalist and medical officer; and Mr. Quirof Harlan, physicist, from the United States Coast and Geodetic Survey. Norwegians experienced in Arctic work make up the remainder of the party of ten. Mr. Wellman proposes to reach the Pole by a sledging expedition over the pack ice.

The Geologists' Association have arranged an excursion to Birmingham from July 28 to August 3, under the direction of Prof. C. Lapworth, F.R.S., Prof. W. W. Watts, Mr. W. J. Harrison, and Mr. W. Wickham King. A sketch of the geology of the Birmingham district, with special reference to this excursion, will be given at the meeting of the Association to-morrow, July 1.

Mr. Walter E. Archer, Inspector of Salmon Fisheries under the Fishery Board for Scotland, has been appointed Chief Inspector of Fisheries to the Board of Trade, in succession to Mr. A. D. Berrington, who has retired. On Mr. Berrington's retirement, the Fisheries Department and the Harbour Department of the Board of Trade have been combined into one department, which will be called the Fisheries and Harbour Department, and will be under the charge of the Hon. T. H. W. Pelham, as Assistant Secretary.

The death is announced of Dr. Charles E. Emery, the well-known American engineer. Dr. Emery was a member of the Institution of Civil Engineers, and received a Watt medal and Telford premium for a paper in which he described the plant constructed by him at New York for the house-to-house distribution of steam raised in a central boiler. He was a prominent member of the principal American engineering societies, and was president of the New York Electrical Society in 1896-97. He also held the post of non-resident professor of the Cornell University.

The Committee appointed to consider the present state of the law with regard to the storage, transport, and sale of petroleum have decided to recommend Parliament to raise the legal flash-point of oil from 73° F. to 100° F. It is believed that comparatively few lamp accidents will occur when the use, as an illuminant, of oil with a flash-point below 100° F. is forbidden; but unless the suggested legislation also provides against the construction and sale of lamps with glass reservoirs and of faulty design, the raising of the flash-point of the oil burned in these lamps will only partly prevent the accidents.

The annual general meeting of the British Institute of Preventive Medicine was held on Friday, June 24, at Chelsea. The meeting was attended by the Duke of Westminster, Earl of Feversham, Lord Lister, Dr. Pye-Smith, Dr. Thomas Bridgwater, and others. The Report states that during the year the work of the Institute has been marked by progression and expansion. The internal fittings of the new building are in an advanced state, some departments are already in full operation, and it is confidently anticipated that all will be fully equipped in the early autumn. The demand for diphtheria and streptococcus serum has increased, and there has also been an increased demand for mallein and tuberculin. The Institute has rented laboratory accommodation to the Local Government Board for the purpose of preparing glycerinated calf lymph. The volume of *Transactions*, published by Messrs. Macmillan and Co. on behalf of the Institute, contained nine original contributions by members of the staff. A number of fresh investigations have been conducted and completed during the year; some of these are published, and others are on the eve of publication. There are also other investigations in progress, and the laboratories continue to attract research workers. The Institute has endeavoured to encourage the periodical examination of water and water supplies, and several local authorities have requested the Institute to undertake this systematic examination on their behalf. Bacteriological work has also been undertaken for several additional sanitary authorities. In the new building every facility is being provided for the furtherance of bacteriological research. The Institute will require, however, a considerable addition to its funds to enable it to carry out adequately the objects for which it was founded.

THE preliminary programme of the sixteenth Congress of the Sanitary Institute, to be held in Birmingham, from September 27 to October 1, has now been issued. The President of the Congress is Sir Joseph Fayrer, Bart., K.C.S.I., F.R.S. Dr. Christopher Childs will deliver the lecture to the Congress, and Dr. Alex Hill, Master of Downing College and Vice-Chancellor of Cambridge University, will deliver the popular lecture. Excursions to places of interest in connection with sanitation will be arranged for those attending the Congress. A conversazione will be given by the Right Hon. the Lord Mayor (Councillor C. G. Beale), and a garden party, at the Botanical Gardens, Edgbaston, will be given by members of the Sanitary Committee. It appears from the programme that over three hundred authorities, including several County Councils, have already appointed delegates to the Congress, and, as there are also over two thousand members and associates in the Institute, there will probably be a large attendance in addition to the local members of the Congress. In connection with the Congress, a Health Exhibition of apparatus and appliances relating to health and domestic use will be held as a practical illustration of the application and carrying out of the principles and methods discussed at the meetings; which not only serves this purpose, but also an important one in diffusing sanitary knowledge among a large class who do not attend the other meetings of the Congress. The Congress will include three general addresses and lectures. Three Sections will meet for two days each, dealing with (1) Sanitary Science and Preventive Medicine, presided over by Dr. Alfred Hill; (2) Engineering and Architecture, presided over by Mr. W. Henman; (3) Physics, Chemistry, and Biology, Dr. G. Sims Woodhead. There will be five special conferences: Municipal Representatives, presided over by Alderman W. Cook; Medical Officers of Health, presided over by Dr. John C. McVail; Municipal and County Engineers, presided over by Mr. T. de Courcy Meade; Sanitary Inspectors, presided over by Mr. W. W. West; Domestic Hygiene, presided over by Mrs. C. G. Beale (the Lady Mayoress). The local arrangements are in the hands of an influential local Committee, presided over by the Right Hon. the Lord Mayor of Birmingham, with Prof. A. Bostock Hill, Mr. W. Bayley Marshall, and Mr. J. E. Willcox as Honorary Secretaries.

DR. G. VAILATI, writing in the *Bolletino di Storia e Bibliografia Matematica*, has brought to light an obsolete book of Euclid dealing with balances and the principle of the lever. This work has become known through an Arabic translation by Ibn Musa in the National Library at Paris, an account of which was given in 1851 by Woepke in the *Journal Asiatique*, but seems to have been overlooked by mathematicians. Euclid's reasoning is based on the two axioms: (1) that if a loaded lamina balances about a horizontal axis, it will continue to balance when the weights are displaced parallel to the axis; (2) if a lamina balances horizontally about two intersecting axes in its plane, it will also balance about their point of intersection. From these axioms, Euclid deduces a proposition *practically* equivalent to a special case of the theorem that three equal weights placed at the vertices of a triangle will balance about a median. Then by the first axiom a second proposition is proved, virtually amounting to the statement that a single weight on one side of a lever will balance two equal weights on the opposite side if the distance of the first from the fulcrum is equal to the sum of the distances of the second and third. By the superposition of such sets of equilibrating systems, and the removal of pairs of weights symmetrically placed on opposite sides of the fulcrum, Euclid arrives at the conditions of equilibrium on a lever whose arms are in the ratio of two whole numbers by a method closely analogous to that adopted by Archimedes.

DR. ADRIEN GUÉBHARD, of St. Vallier-de-Thiey, sends us a number of papers dealing with the supposed photographic representation of currents emanating from the human body, concerning which much appears to have been said in France a few months ago, when the subject was brought into prominence by the announced discoveries of Dr. Baraduc and the late Dr. Luys. Briefly told, when a slightly fogged photographic plate is developed in a shallow bath, and the experimenter presses his fingers on the plate during the process, streaks are observed to radiate from the parts touched. So far from the effect being due to "animal magnetism," or any of the other occult influences with which spiritualists are wont to deal, Dr. Guébhard shows that the lines are simply caused by convection currents produced by the warmth of the operator's finger. If for the latter there be substituted a small india-rubber ball filled with warm water, exactly the same impressions are produced. Similar results are obtained with a body cooled below the temperature of the developer, and in each case their intensity is greater the greater the difference of temperature. In some of Dr. Guébhard's figures the lines closely resemble the lines of flow due to sources and sinks, or the lines assumed by iron filings in the presence of magnets; as representations of the lines of flow of convection currents, these figures may interest the physicist.

WE have received a copy of the observations made at the Blue Hill Meteorological Observatory, Massachusetts, during the year 1896, forming Part i. vol. xlii. of the *Annals* of the Astronomical Observatory of Harvard College, containing results of observations made at three stations as in former years. The primary station is the observatory on the summit of Great Blue Hill, at an elevation of 640 feet above mean sea-level, and the two secondary stations are situated northwest of it, one being at the base of Blue Hill. In addition to the usual meteorological tables and hourly cloud observations and measurements of heights and velocities recommended by the International Meteorological Committee, the work contains an interesting study of special cloud forms and their relations to cyclones and anticyclones, as well as to other phenomena, by A. E. Sweetland. One of the principal features of the work of the observatory is the exploration of the air by means of kites. A full description of the methods employed is given by S. P. Fergusson, and a valuable discussion of the records by H. H. Clayton. This exploration was begun in August 1894, and is, we believe, the most thorough study of the lower strata of free air ever made, and occasionally very high altitudes are also attained. We are glad to see that the continuance of the useful observations at Blue Hill, now maintained by the liberality of Mr. A. L. Rotch, has been assured by the leasing of the land around the observatory by Harvard College, and that it is expected that the work will ultimately become a part of that carried on directly by that University.

VARIOUS schemes have from time to time been suggested for utilising the power of the tides and waves as a motive force, and ingenious models have been constructed showing the various methods proposed. The plans consist generally either of a system of reservoirs for storing the water at high tide and using it by means of water-wheels or turbines as the tide falls, or else by compressing air in a chamber and making use of its expansion in working an engine. None of these schemes have, however, so far been carried into practical effect. On one or more tidal creeks in this country there have, however, existed water-wheels for grinding corn worked by the tides. Across the creek self-acting doors are placed which open to let the tide flow up, and automatically close as soon as it begins to recede. For several hours each tide there is thus afforded a supply of water with sufficient head to work a water-wheel which turns the machinery. Recently, at Los Angeles, an attempt has been made to make use of the waves. At the end of a pier 350 feet long, three floats were constructed acting on hydraulic air compressors connected with storage tanks holding water situated at different levels. By means of the compressed air the water is driven from a lower into a higher tank, which affords the head required to work a water motor. The waste water from the motor flows back again into the lower tank, to be again raised by the compressor. The varying effect of the waves is compensated by this arrangement of air and water pressure. The experiment is said to have proved sufficiently satisfactory to warrant the extension of the system so as to develop 200 horse-power.

IT is seldom that military operations afford much opportunity for scientific research, but the Ashanti expedition of 1896 was fortunately an exception. Upon the recommendation of Kew, Surgeon-Captain H. A. Cummins accompanied the expedition as a member of the medical staff, and he succeeded in bringing back a collection of about two hundred species, including nine which were new, and one new genus. A list of these plants, with their geographical distribution and descriptions of the new species, and notes on the physical and botanical characters of the country traversed by Surgeon-Captain Cummins, appears in the latest issue of the *Kew Bulletin* (Nos. 136–137). The economic products of the region from Cape Coast Castle to the Moinsi Hills, which are 150 miles inland, are numerous. "Plantains are largely grown, and form the principal food of the inhabitants. Indian corn is extensively cultivated and grows freely. Sugar-cane is grown in many of the villages. Pine-apples are found all over the country in such a way as to lead persons who have travelled far inland to believe them indigenous. Cola, rubber and gum trees grow plentifully in the forest region, and are reported to be more numerous in the districts around Kumassi." In addition to these plants, there are many trees producing valuable wood in great quantity. The country is unhealthy, but Surgeon-Captain Cummins states that if a railway penetrated the forest zone, establishing a rapid means of communication with the healthy mountainous interior, trade in the vegetable and mineral products of the country could be carried on without the present limitations.

ANOTHER interesting article in the *Kew Bulletin* is a brief account of the principal botanical museums in Belgium and Holland, by Mr. J. M. Hillier, assistant in the museums of the Royal Gardens. A noteworthy preservative solution, consisting of alcohol with the addition of two per cent. of hydrochloric acid, was found in use at the University Botanic Garden, Ghent. The object to be preserved is placed in this solution for a few weeks according to discretion, after which it is put into methylated spirit for permanent preservation. In the Commercial Museum at Brussels scientific names are not as a rule attached to the products, but useful details are given on the labels with regard to prices, &c. Mr. Hillier describes Prof. Errera's process for preserving flowers and other objects in their natural colours. "The specimen to be preserved is placed in a conical-shaped paper bag, the narrow diameter resting in the mouth of a glass jar. The bag is carefully filled up with finely sifted sand, after which the jar, together with its contents, is kept at a warm even temperature for two or three weeks, at the expiration of which time the sand is carefully removed and the dried specimen placed in a stoppered jar. The stopper must be hollow and filled with unslaked lime, the latter being kept in position by a thin piece of leather tied over the portion of the stopper which is inserted into the mouth of the jar. The lime absorbs all moisture, and so preserves the specimen from deterioration by damp."

MR. FRANK FINN, Deputy Superintendent of the Indian Museum, contributes a number of interesting notes on natural history to the *Proceedings* of the Asiatic Society of Bengal. Much remains to be done in the observation of living birds, even when these belong to quite common and well-known species. Mr. Finn's notes on peculiarities of attitude, &c., of various birds are, therefore, very useful contributions to ornithology. In a note on the position of the feet of the "Picarian" birds and of parrots in flight, he concludes from his experiences that "supposing the same habit of carrying the feet to run through a family, the forward position of the feet in flight probably characterises hoopoes, woodpeckers, and barbets, and the backward one certainly obtains among kingfishers, rollers, hornbills, cuckoos, and parrots." In other notes Mr. Finn describes various species of Grebes, with especial reference to the power of walking and digestion possessed by these birds; brings forward an instance which confirms the common belief in India that the whip-snake has a propensity for deliberately striking at the eye; and shows that the Indian Gossander can walk like other ducks, and does so in the same attitude. Such notes as these, on imperfectly known points in the habits and economy of birds, are of distinct service to students of avian classification.

MESSRS. W. WESLEY AND SON, Essex Street, Strand, have issued a Catalogue (No. 131) of works on gardening in all its branches, reaching to 714 publications.

WE have received the reports, for 1896 and 1897, of the Botanical Department of the Indiana Agricultural Experiment Station, by Mr. J. C. Arthur, State botanist, including an account of experiments on the cultivation of various agricultural crops and garden flowers.

FROM the Government Laboratory, Antigua, we have received a report of the results obtained on the Experimental Fields, at Skerrett's School, 1897. It refers almost entirely to the cultivation of the sugar-cane, especially to the relative values of different varieties, and to the diseases to which the cane is subject, and the remedies for them.

MESSRS. SEALY, BRYERS, AND WALKER, of Dublin, announce for early publication Mr. H. Chichester Hart's "Flora of Co. Donegal, with Introduction on Topography, Geology, Geographical Distribution, &c., and Appendices on Plant Names and Plant Lore and Climate."

THE Department of Agriculture, Victoria, has issued a brochure of additions to the fungi on the vine in Australia, by Mr. D. McAlpine, Government Vegetable Pathologist, assisted by Mr. G. H. Robinson. It includes a very full account of twenty-three species, fourteen of which are parasitic and nine saprophytic fungi, ten of them being new to science. The report is very copiously illustrated.

IN *Bulletin* No. 1 of the Geological Survey of Western Australia, Mr. A. Gibb Maitland, Government Geologist, gives a bibliography of the works, papers, reports, and maps bearing upon the geology, mineralogy, mining, and palæontology of the Colony. The publications are arranged in alphabetical order under authors' names.

THE tenth issue of "The Wealth and Progress of New South Wales," by Mr. T. A. Coghlan, bringing the affairs of the Colony up to the end of 1897, has just been distributed by the Agent-General for New South Wales. The volume contains more than a thousand pages, and is filled with accurate information of service to persons who are engaged in the active life of the Colony, and not without interest to those who are not concerned about the details of local affairs. It would be to the credit of all our Colonies if they published such admirable life-histories as the one for which Mr. Coghlan is responsible.

THE first volume of a second edition of a useful directory of German makers of optical instruments, and other instruments of precision, has been published by the firm of F. and M. Harrwitz, Berlin. This "Adressbuch" is edited by Herr F. Harrwitz, the editor of the journal *Der Mechaniker*, and has been greatly enlarged. It contains the names and addresses of German mechanicians, opticians, glass instrument makers, and allied callings, arranged alphabetically according to names of firms, towns, and specialities. How numerous these makers of scientific instruments are in Germany may be judged from the fact that the directory just issued contains nearly four hundred pages.

THE number of the *Journal of the Royal Microscopical Society* for June contains a reference by the President, Mr. E. M. Nelson, to an old book on optics, Zahn's "Oculus Artificialis," published in 1702. The following figures, taken from the work, are reproduced in the *Journal* :—A telescope-sight for a musket and a cannon, with the legend : "Bombardae et omni genere balistarum ac tormentorum bellicorum tubum opticum sive telescopicum aptare, quo visus ad scopum exactè dirigi poterit." A sunshine recorder or "Organum heliocausticum," with the legend "Horas Luce Sono tibi sphaerula Vitrea monstrat, ignis nil mirum Coelicus urget opus." A series of mirrors for a telescope called "Catoptrico dioptrica telescopica." The same number of the *Journal* contains a lengthy abstract of Dr. A. Clifford Mercer's important paper on "Aperture as a Factor in Microscopic Vision," delivered as a presidential address to the American Microscopical Society ; also an abstract of Mr. E. M. Nelson's paper on "Microscopic Vision," read before the Bristol Naturalists' Society; and the commencement of a series of papers by Mr. Fortescue W. Millett on recent Foraminifera of the Malay Archipelago, collected by Mr. A. Durrand, illustrated by plates.

AMONG the volumes lately published by W. Engelmann, Leipzig, in Ostwald's valuable series of reprints and translations of scientific classics (*Klassiker der exakten Wissenschaften*) is a translation, with notes, by Herr W. Abendroth, of Newton's first book on optics, dealing with reflection, refraction, and colour, Four of Ernst von Brücke's papers on plant physiology, published between 1844 and 1862, are reprinted in No. 95 of the series; and a paper, translated from the Swedish of Eilhard Mitscherlich (1821), on the relation between the chemical composition and crystalline form of salts of arsenic and phosphorus, forms No. 94. The article on crystallography and crystallometry, contributed by J. F. Christian Hessel to Gehler's *Physikalische Wörterbuche* in 1830, appears as a reprint in Nos. 88 and 89, edited by Herr E. Hess. Prof. Ernst von Meyer edits No. 92, containing a paper by H. Kolbe (1859) on the natural connection of organic with inorganic compounds, and its bearing upon the classification of organic bodies. No. 90 is a translation from the French of a geometrical paper (1848) by A. Bravais; and No. 91 is a German edition of a paper by G. Lejeune Dirichlet (1839-40) on various applications of infinitesimal analysis to the theory of numbers.

THE value of the Reports of the U.S. National Museum has been so often referred to in these columns, that the announcement of the publication of a new volume containing a report upon the condition of the Museum and the work accomplished in its various departments, is sufficient to convey to all who are familiar with the Smithsonian Reports the fact that a large amount of information has been added to the pabulum of scientific readers. The Report just issued runs into 1080 pages, is lavishly illustrated, and is full of interesting matter. In an elaborate paper, Dr. Franz Boas describes and illustrates the collections of the Museum referring to the social organisation and secret societies of the Indians of the coast of British Columbia. His paper is based upon personal studies made during a series of years, and forms a very valuable contribution to the ethnology of the Kwakiutl Indians. Many brilliant reproductions of photographs taken during the performance of native ceremonies are given, and also the transcriptions of a series of phonographic records of songs belonging to the ceremonials. "The Graphic Art of the Eskimos" is dealt with by Dr. W. J. Hoffmann in another long and well-illustrated essay, which will interest archæologists as well as anthropologists. In addition to the researches in pictography, the paper contains much information upon the gesture language of the various tribes studied. A comparison of the pictographs, and various painted records found in different parts of the United States, with the Eskimo work, show the latter to be superior to the former, especially in faithful reproduction of animal forms and delicacy of artistic execution. The remaining papers in the volume are much shorter than the two already mentioned. Among the subjects dealt with are the tongues of birds, taxidermical methods in the Leyden Museum, and the antiquity of the Red Race in America.

SINCE the memorable researches of Humphry Davy on the decomposition of the alkaline earths, many methods have been suggested for preparing the metal calcium in the pure state. M. Moissan, in the current number of the *Comptes rendus*, after showing that none of these yield a pure metal, describes two ways of preparing crystallised calcium containing less than one per cent. of impurities. The first of the methods depends upon the property possessed by calcium of dissolving in liquid sodium at a dull red heat, and separating out in crystals on cooling. By treating the mass cautiously with absolute alcohol the sodium is removed, and the calcium is obtained in the form of brilliant white hexagonal crystals. Similar white crystals of calcium can be obtained by the electrolysis of fused calcium iodide. It is noteworthy that calcium has usually been described by previous workers as a yellow metal ; doubtless owing to the presence of impurities.

THE additions to the Zoological Society's Gardens during the past week include a Sykes's Monkey (*Cercopithecus albigularis*, ♀) from West Africa, presented by Miss Gladys Carey ; a Macaque Monkey (*Macacus cynomolgus*, ♂) from India, presented by Miss Stankowski ; a Brush-tailed Kangaroo (*Petrogale penicillata*, ♂) from Australia, presented by Mr. C. J. Leyland ; two Red-backed Pelicans (*Pelicanus rufescens*) from the River Niger, presented by Mr. H. S. Bernstein ; a Black Hangnest (*Cassidix oryzivora*) from the Amazons, presented by Mr. R. Phillipps ; two Yellow-cheeked Lemurs (*Lemur xanthomystax*), two Madagascar Tree Boas (*Corallus madagascariensis*) from Madagascar, a Banded Ichneumon (*Crossarchus fasciatus*), an Angulated Tortoise (*Testudo angulata*) from Africa, a Blue-fronted Amazon (*Chrysotis æstiva*) from Brazil, six Algerian Tortoises (*Testudo ibera*) from Algeria, deposited ; a Great Ant-eater (*Myrmecophaga jubata*), a Tamandua Ant-eater (*Tamandua tetradactyla*) from South America, a Green-winged Trumpeter

(*Psophia viridis*) from the Amazons, two White-necked Storks (*Dissura episcopus*) from Africa, two Dusky Francolins (*Pternistes infuscatus*) from British East Africa, a Madagascar Tree Boa (*Corallus madagascariensis*) from Madagascar, purchased; two Red and Yellow Macaws (*Ara chloroptera*) from South America, received in exchange; a Hybrid Zebra (between *Equus caballus*, ♂, and *Equus burchelli*, ♀), a White-tailed Gnu (*Connochœtes gnu*, ♂), two Thars (*Hemitragus jemlaica*, ♂ ♀), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN JULY:—

July	3.	8h. 57m. Partial eclipse of the moon. Magnitude 0·934.
	4.	Wolf's comet due at perihelion.
	13.	Venus 1° north of α Leonis (Regulus).
	15.	Venus. Illuminated portion of disc 0·765.
	15.	Mars. ,, ,, ,, 0·904.
	15.	Jupiter. Polar diameter, 31″·9.
	15.	Saturn. ,, ,, 16″·6.
	16.	6h. 31m. to 9h. 25m. Transit of Jupiter's Sat. III.
	18.	8h. 7m. Annular eclipse of the sun invisible at Greenwich.
	18.	Wolf's comet 27′ distant from Mars.
	19.	Saturn. Outer minor axis of outer ring, 17″·89.
	26.	22h. 0m. Mercury nearly occults α Leonis (Regulus).
	28.	12h. 49m. Moon in conjunction with α Scorpii (Antares).
	28.	Many meteors from Aquarius and Perseus.
	30.	7h. 31m. to 8h. 41m. Occultation of λ Sagittarii (mag. 3·1) by the moon.

COMETS THAT ARE NOW VISIBLE.—There is plenty of cometary news in the three most recent numbers of the *Astronomische Nachrichten* (3498–3500). As regards comet Coddington-Pauly, which has a declination too southern for the ephemeris to be of any use in this column, Prof. Berberich publishes some new elements (*Astr. Nach.*, No. 3500) based on other observations than those previously used by him, which differ somewhat from the values given in his first computation. The comet has a southerly movement, so that it will not be visible in our latitude.

Comet Perrine (June 14), on the other hand, has a great northerly declination, and is increasing in brightness very rapidly. The elements and ephemeris of this comet have been computed by Perrine and Aitken, and also by Berberich. The elements obtained by the former we published last week, but they differ slightly from those calculated by Berberich, these being as follows:—

$$T = 1898 \text{ August } 4{\cdot}7473 \text{ Berlin M.T.}$$

$$\left.\begin{aligned} \omega &= 235^\circ\ 16'{\cdot}77 \\ \Omega &= 252\ \ \ 2{\cdot}34 \\ i &= 72\ \ 11{\cdot}43 \end{aligned}\right\} 1898{\cdot}0$$

$$\log q = 9{\cdot}44405$$

The ephemeris for the current week, according to these values, is:—

Ephemeris for 12h. Berlin M.T.

1898.		R.A. (app.) h. m. s.	Decl. (app.) ° ′	log *r*.	log Δ.	Br.
June	30	5 4 3	+52 57·9			
July	1	9 56	52 23·3	9·9817	0·2061	2·34
	2	15 46	51 46·9			
	3	21 34	51 8·7			
	4	27 19	50 28·7			
	5	33 1	49 46·7	9·9415	0·1904	3·03
	6	38 40	49 2·7			
July	7	5 44 15	+48 16·7			

The new comet discovered by Giacobini is gradually decreasing its southern declination, but the elements at present calculated are described as uncertain. With a diameter of 2′, an excentric condensation, and of about the 10th magnitude (June 21), the comet is not an easy object. Those wishing to observe it will find the following positions useful.

Ephemeris for 12h. Berlin M.T.

1898.		R.A. (app.) h. m. s.	Decl. (app.) ° ′	Br.
June	29	18 5 48	−21 36·2	1·35
July	3	17 8 1	19 28·6	1·22
	7	16 20 13	16 47·2	1·01
	11	15 43 37	−14 11·4	0·79

THE FIRST SATELLITE OF JUPITER.—In two early numbers of *Astronomy and Astrophysics* (November 1894 and May 1893) our readers may remember that Prof. W. H. Pickering contributed an account of a very interesting series of observations on the shapes of the satellites of Jupiter, and the conclusions he arrived at were that the discs were by no means round, but assumed very decided irregularities as they performed their rotations. These satellites have been further minutely examined by Mr. A. E. Douglass during last year, and in the *Astronomische Nachrichten* (No. 3500) he describes what knowledge has been gained by the observations of the first satellite. These were made in Mexico, from February 18 to March 28, with the Clark 24-inch, and in Flagstaff from May 16 to June 9. We must confine ourselves to a very brief summary of this paper, and refer our readers to the original for the minute details given both in the text and accompanying plate.

Although the markings on the satellite were sometimes well seen, the observations were not numerous enough over a long period of time to effectively map and determine the period of rotation by tracing the succession of detail. Mr. Douglass adopted Prof. Pickering's method of observing the changes in the elliptical form of the satellite's disc. After an elaborate trial of several periods he was led to deduce a period of 12h. 25·8m. for the year 1897, a value not very different from that found by Pickering in 1892, namely 13 hours. Most peculiar are the markings on this satellite. Assuming the axis of the satellite to be perpendicular to the plane of its orbit, they appear to extend from about + 60° to − 60° in latitude, and they take roughly the form of lines directed either to the north or south pole. Their general distribution can be best described and their symmetry best illustrated, as Mr. Douglass says, "by saying that they nearly form portions of five great circles passing round the satellite."

The micrometer measures for determining the elliptical form of the disc gave indications of a large ellipticity. Mr. Douglass thinks that this flattening is real, and not due to the presence of surface markings near the limb. The following brief table shows the values of the ellipticity and period of rotation for the periods observed since 1892:—

Date.		Ellipticity.	Period. h. m.	Obs.	Telescope
Dec.	1892	100–110	13 3	Pickering	13 inch
Oct.	1894	108–120	13 3	,,	18 inch
March	1895	104–120	(?)	Douglass	,,
March	1897	115–130	12 25·8	,,	24 inch

The indications of an increase in the ellipticity and decrease in the period of rotation led Mr. Douglass to investigate the question of whether a decrease in the size of the disc had been observed. An examination of the existing measures showed that such a change has probably taken place, but the values cannot be relied on for certain. If this decrease in size be an actual fact, then the increase in rotational velocity and increase in mean polar compression would naturally follow.

THE METEOR SHOWER OF NOVEMBER 13, 1897.—Those who intend to systematically observe or photograph the meteor shower next November, will find in the account of the arrangements made last year at the Harvard College Observatory (*Annals*, vol. xli. No. 5) many interesting suggestions. Prof. W. H. Pickering, as will be gathered from his description in the above-mentioned *Annals*, made arrangements for a combined attack on the night of the 13th at various stations connected with the observatory. To present an idea of the scale in which such work is undertaken in America, in addition to visual observations, we give the number of plates exposed and instruments used. Three plates were taken with the Draper 11-inch telescope, with two objective prisms of 15°. Fourteen plates with the 8-inch, with two objective prisms of 6° each. Twelve plates with the 6-inch, with objective prism of 6°. Eight plates with a Voigtländer 5-inch, with an objective prism of 6°. Three plates with a Ross rapid rectilinear lens of 1·5 inch, angle of prism 15°. With such a collection of fine instruments at work, it was only too disappointing that the meteors were so few and faint;